

Brief of the cited document 3 (2002-528375-W (WO00/26026))

This invention relates generally to rapid prototyping techniques, and more particularly to plaster-based Three Dimensional Printing materials and methods.

Referring now to FIGS. 2 and 3, a schematic representation of a printing method using the materials system of the invention is presented. According to the method, a layer of particulate material 20 is applied on a downwardly movable surface 22 of a container 24. The layer of particulate material 20 may be formed in any manner, and preferably is applied using a counter-roller, which minimizes disruption of any previously applied layers.

The thickness of an individual layer used to build the prototype articles of this invention preferably range from about 12 nm to about 125  $\mu$ m, more preferably from about 50 nm to about 125  $\mu$ m. In practice, the layers of particulate material are typically limited by the amount of aqueous fluid that may be delivered to the layer.

FIG. 3 is a schematic representation of an ink-jet nozzle 28 delivering a plurality of droplets of an aqueous fluid 26 to a portion 30 of the layer 20 of the particulate material in a two-dimensional pattern. According to the method, the aqueous fluid 26 is delivered to the layer of particulate material in two-dimensional pattern using any convenient mechanism, such as a Drop-On-Demand (hereinafter "DOD"). In the first portion 30 of the particulate material layer, a reaction is initiated between the plaster contained in the particulate material layer and the water contained in the aqueous fluid, causing the plaster to rehydrate. The reaction product of the aqueous fluid and particulate material forms an essentially solid circular layer that becomes a cross-sectional portion of the final article.

The previous steps of applying a layer of particulate material, applying the aqueous fluid, and indexing the movable surface downward are repeated until the final article is completed.

In this invention, an adhesive, or adhesives, may be added to the particulate material and/or the aqueous fluid. In the embodiment, the adhesive is preferably a water soluble resin, such as, polyvinyl alcohol, (PVA), polyvinyl pyrrolidone (PVP), or dextrin.

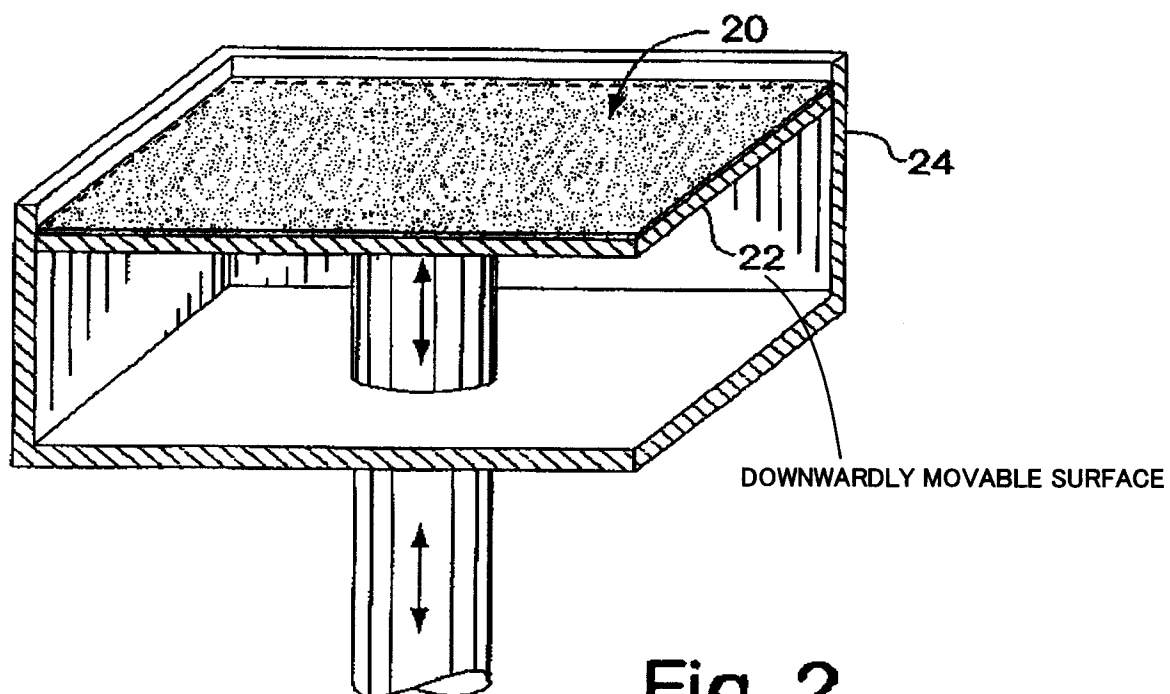


Fig. 2

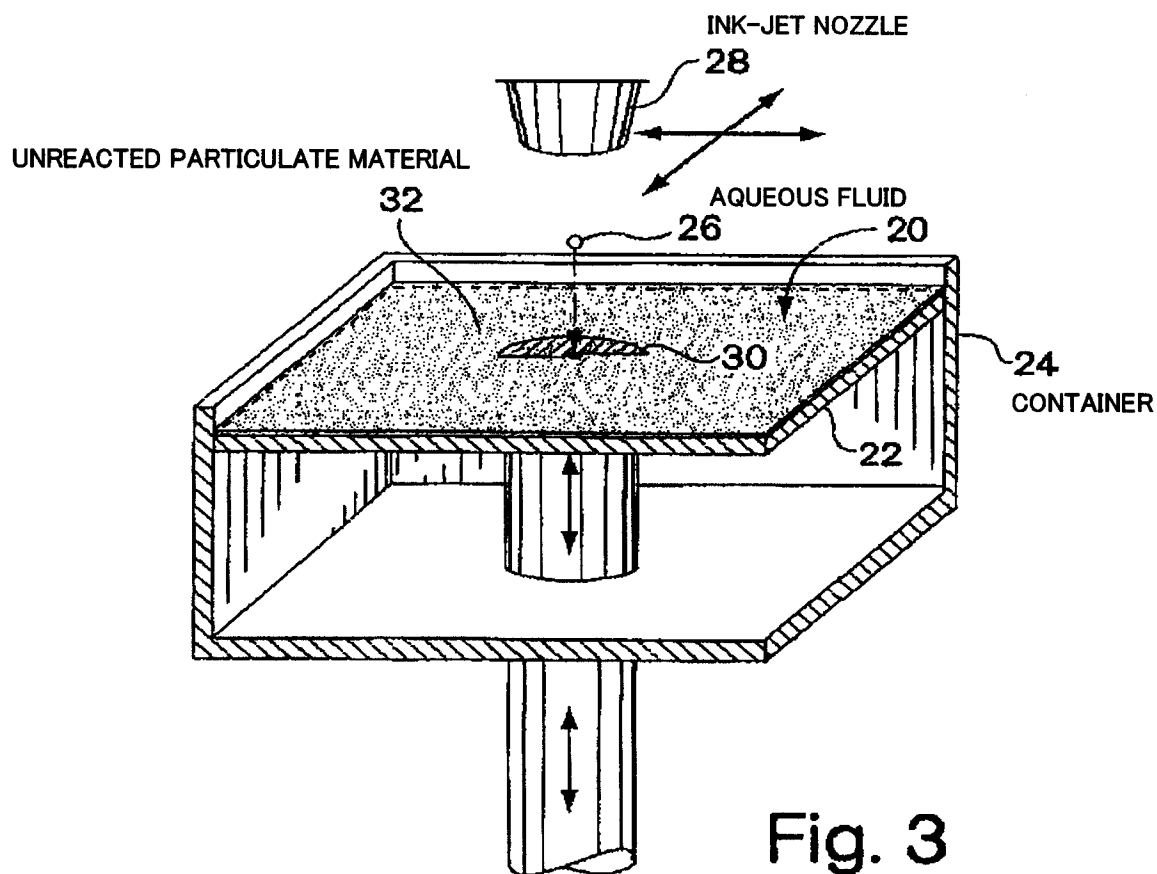


Fig. 3

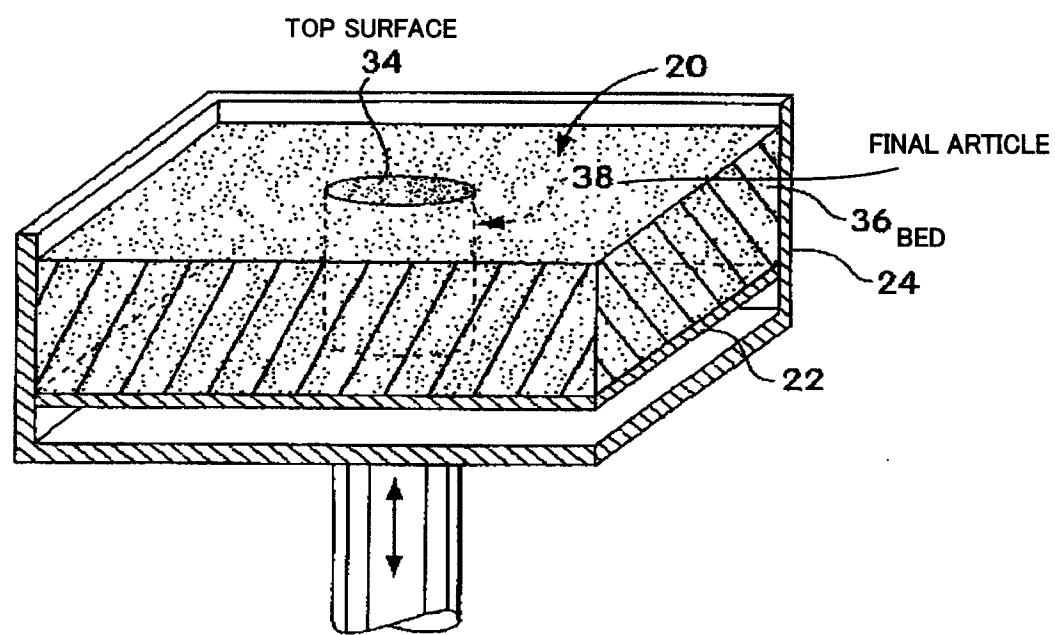


Fig. 4

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Title: THREE DIMENSIONAL PRINTING MATERIAL SYSTEM AND METHOD

Abstract:

The present invention is directed to a 3DP™ three dimensional printing material system and method, and an article made therefrom. The method of the present invention includes building cross-sectional portions of a three-dimensional article, and assembling the individual cross-sectional areas in a layer-wise fashion to form a final article. The individual cross-sectional areas are built by using an ink-jet printhead to deliver an aqueous fluid to a particulate material that includes plaster.

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